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Environmental Behavior of Plutonium Isotopes in the Marine Environment of Enewetak Atoll

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Studies of ^{239,240}Pu in the environment provide a basis for understanding the behavior of other plutonium isotopes, such as ^{238}Pu, since environmental processes are very unlikely to differentiate among the isotopes. However there have been and continue to be reports in the literature which suggest a difference in behavior of ^{238}Pu in some environments. Different nuclear devices were exploded at Enewetak Atoll as part of the U.S. testing program during the 1940's and 1950's. Plutonium isotopes were formed by reaction involving atomic particles and device components; from the decay of parent radionuclides produced during nuclear reactions; and from residual unfissioned or unreacted weapons-grade fissile fuel. The behavior of plutonium isotopes in this aquatic environment has been investigated over the last three decades. S values, or the percent ^{238}Pu relative to total plutonium alpha activity, are higher here than values measured in other aquatic environments and consequently the analytical uncertainty associated with environmental ^{238}Pu measurements by alpha spectrometry is reduced. The mobilization of plutonium isotopes from the contaminated sediments to the water column and to different aquatic organisms is discussed. There appears to be little difference in the behavior among the plutonium isotopes in this complex environment with time.

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